EF

Notice of Allowability	Application No.	Applicant(s)	
	10/825,240	STEIGERWALD ET AL.	
	Examiner	Art Unit	
	Bernard E. Souw	2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Transm. 04/16/2004*.

2. ☒ The allowed claim(s) is/are *1-42*.

3. ☒ The drawings filed on *16 April 2004* are accepted by the Examiner.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 08/30/04+09/27/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Amendment

1. The Amendment filed 04/29/2005 has been entered. The present Office Action is made with all the arguments being fully considered.

Claim 42 has been amended.

Claims 1-42 remain pending in this office action.

Information Disclosure Statement

2. Receipt is acknowledged of information disclosure statements (IDS) submitted on 09/27/2004 and 8/30/2004. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements are being considered by the examiner.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), (DE 10317894.5) filed on 04/17/2003, which papers have been placed of record in the file.

Allowance

4. Claims 1- 42 are allowed.

Reasons for Allowance

5. The following is an examiner's statement of reasons for allowance:

► An electron microscopy system with secondary electron detection, comprising a pulsed electron beam source, a cavity resonator disposed in the secondary electron beam downstream from an objective lens and upstream from a secondary electron detector, and a high frequency power applied to the cavity resonator such that a main component of the electromagnetic field generated in the cavity resonator is a magnetic field oriented transversely to the secondary electron beam path inside the cavity resonator, as recited in claim 1, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy system with secondary electron detection, comprising a pulsed electron beam source, a deflector disposed in the secondary electron beam downstream from an objective lens and upstream from a secondary electron detector, and a high frequency power applied to the secondary electron deflector, as recited in claim 19, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy system with secondary particle detection, comprising a pulsed electron beam source and a deflector disposed in the secondary electron beam downstream from an objective lens and upstream from a secondary electron detector, so as to perform a time resolving secondary electron detection having a resolution of 100 ps, thus implying a use of high frequency technique, as recited in claim 22, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy system with secondary particle detection, comprising a pulsed electron beam source and a cavity resonator disposed in the beam path of the secondary electrons downstream of an objective lens and upstream from the electron

detector, as recited in claim 1, is neither anticipated nor rendered obvious by any prior art.

► A charged particle focusing system comprising a pulsed charged particle beam source and a cavity resonator disposed in the beam path upstream of the focusing lens with the resonator's electric field oriented in the direction of the beam wherein the electric field strength of the oscillating field inside the cavity increases with increasing distance from the cavity center in a direction transverse to the beam path, the pulsed charged particle source and the resonator so synchronized that the pulsed charged particle beam traversing the resonator either gains or loses an amount of its energy, thus increasing or decreasing the energy with increasing distance from the cavity center, as recited in claim 24, is neither anticipated nor rendered obvious by any prior art.

► A charged particle focusing system comprising a pulsed charged particle beam source generating bunches of charged particles, a focusing lens and a cavity resonator disposed in the beam path upstream of the focusing lens and at a distance apart to provide a drift region in between, wherein the resonator's oscillating electric field is oriented in the direction of the beam, the pulsed particle source and the resonator so synchronized that a rear portion of the bunch traversing the cavity resonator is accelerated as compared to the front part of the bunch, as recited in claim 26, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy system with secondary particle detection, comprising a pulsed electron beam source and a cavity resonator disposed in the beam path

upstream of the focusing lens, wherein the resonator's oscillating electric field is oriented in the direction of the beam, wherein the electric field strength of the oscillating field inside the cavity increases with increasing distance from the cavity center in a direction transverse to the beam path, the pulsed particle source and the resonator so synchronized that a certain part of the pulsed electron beam traversing the resonator gains an amount of its energy, whereas another part loses its energy, thus increasing or decreasing the energy with increasing distance from the cavity center, as recited in claim 31, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy system with secondary particle detection, comprising a pulsed electron beam source, thus generating bunches of primary electrons, and a cavity resonator disposed in the beam upstream of the focusing lens and at a distance apart to provide a drift region in between with the resonator's electric field oriented in the direction of the beam, wherein the electric field strength of the oscillating field inside the cavity increases with increasing distance from the cavity center in a direction transverse to the beam path, the pulsed particle source and the resonator so synchronized that a rear portion of the bunch of the pulsed primary electron beam traversing the resonator is accelerated as compared to the front part of the bunch, as recited in claim 33, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy method with secondary particle detection, comprising the steps of generating bunches of primary electrons, and using a cavity resonator to accelerate a first group of primary electrons relative to a second group, and focusing the

bunch of electrons onto a sample, as recited in claim 39, is neither anticipated nor rendered obvious by any prior art.

► An electron microscopy method with secondary particle detection, comprising the steps of generating bunches of primary electrons, focusing the bunch of electrons onto a sample, and detecting a time structure of the electron intensities of the bunches of secondary electrons emanating from the sample by allowing the secondary electrons to traverse a cavity resonator that is supplied with a high frequency power to generate an electromagnetic field that deflects the secondary electrons, as recited in claim 42, is neither anticipated nor rendered obvious by any prior art.

► Claims 2-18, 20, 21, 23, 25, 27-30, 32, 34-38, 40 and 41 are also allowed for their dependency, either directly or indirectly, on claims 1, 19, 22, 24, 26, 31, 33, 39 or 42.

6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Relevant Prior Art

7. This prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

(a) USPAT 6,73,647 (IDS) and US-PGPUB 2004/0000646, both issued to Schönhense et al., disclose a method of accelerating and/or decelerating parts of the primary beam. However, both of Schönhense's disclosures are teaching away from the present invention by reciting that cavity resonator has not proven successful for the purpose, and instead, recommending the use of an electrode array, as recited in Col.2/ll.4-14 (USPAT 6,73,647) and in sect.[0010] (US-PGPUB 2004/0000646).

(b) USPAT 4,780,682 issued to Politzer (IDS) discloses a cavity resonator for accelerating and/or decelerating parts of a charged particle beam (CPB). However, Politzer directs his invention to ions injected into a linear accelerator (numeral 100 in Politzer's Fig.1 and Fig.4) and does not suggest applying his invention to electron microscopes. Politzer also does not recite a pulsed CPB. In particular, Politzer does not teach to make the electric field strength increasing or decreasing with a distance traverse to the beam direction, and hence, does not teach to increase or decrease the CPB energy with a distance traverse to the beam direction, as recited in claim 24. Furthermore, Politzer does not teach to put the cavity resonator upstream and at a distance apart from the focusing lens, as recited in present claims 26 and 33.

(c) USPAT 5,686,802, issued to Ikegami, discloses a cavity resonator for uniformizing the energy of an electron beam, and also suggesting its application in electron microscopes. However, Ikegami's cavity resonator operates in a TE mode, i.e., with its electric field transverse to the beam direction, instead of in the direction of the beam, as recited in claims 1, 24, 26, 31 and 33 of the present invention.

(d) USPAT 5,185,571, issued to Brust, discloses a cavity resonator for manipulating an electron beam. However, Brust's cavity resonator is used as a beam modulator (BBS in Fig.3, recited in Col.8/ll.65-68 and Col.1/ll.2-10) to generate short electron beam pulses, instead of making the primary beam energy uniform and/or providing time resolution to the secondary electron beam, as claimed in the present invention.

(e) USPAT 4,626,690 and USPAT 6,310,341, both issued to Todokoro et al., disclose a method of using high frequency signal to periodically change the deflection angle of an electron beam. However, none of Todokoro's disclosures applies high frequency signals to the secondary electron deflector or to achieve time-resolving electron detection, as claimed in the present invention (claims 19 and 22).

(f) USPGPUB 2002/0130262, issued to Nakasuji et al., disclose a method of using a deflector to change the deflection angle of the secondary electron beam prior to detection. However, Nakasuji's secondary electron deflector is not operated with high frequency signal, as claimed in the present invention.

Communications

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E Souw whose telephone number is 571 272 2482. The examiner can normally be reached on Monday thru Friday, 9:00 am to 5:00 pm..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R Lee can be reached on 571 272 2477. The central fax phone

number for the organization where this application or proceeding is assigned is (703) 872-9306 for regular communications as well as for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

bes
April 07, 2005

JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800